History of the CRDSP

Executive Summary

In 1998, the Bureau of Land Management began a program of information development in partnership with the State Historic Preservation Offices (SHPOs) in 13 western states (Alaska, Oregon, California, Nevada, Arizona, New Mexico, Colorado, Utah, Idaho, Wyoming, Montana, North Dakota, South Dakota, and Washington). The Cultural Resources Data Sharing Project has become an important part of the overall relationship between BLM and the SHPOs in the state's where BLM has significant presence and activities. This report summarizes the activities performed by BLM and its SHPO partners since 1998. The report is also a prospectus on where future effort must be made to meet foreseeable and current needs for information, planning, and streamlining of work flow.

History and Background

The Bureau of Land Management Cultural Resources Data Sharing Program (henceforward simply "CRDSP") was begun formally in 1998 from many antecedents. The CRDSP drew together much ongoing work at the time. Several of the states in which BLM has significant presence had long-running programs of data automation and most of the other states of interest to the agency were contemplating the use of automated information in some form. BLM itself had used, and was using, a variety of databases and some geographic information systems. The National Park Service and the U.S. Forest Service were preparing data system designs for enterprise-wide retention of all sorts of biological, cultural, and facilities information. The cost of computing was dropping sharply, with personal computers ubiquitous and wide area networking ever more common. Geographic information systems (GIS), formerly the province of GIS technical experts alone due to their complexity and cost, were less costly and much easier to use for the average professional. An especially significant development was that the record managers in the western State Historic Preservation Offices (SHPOs), states where BLM has a major presence Section 106 actions were (and are) common, had been meeting semi-formally for about ten years to discuss shared technical and procedural issues.

The term "cultural resources" has many potential meanings, ranging from an opera house to an artifact. Archaeological information comprises the bulk of BLM's cultural resources information management, and the term "cultural resources" is used throughout the CRDSP as a shorthand label for archaeology, with the understanding that there are also historic buildings and structures, landscapes, and traditional cultural properties. In general, the term "cultural resources" accords to the sorts of things defined in the National Register Bulletin Number 15 as types of properties. It is useful to remember though, that the management of cultural resources involves not just these resources, but also the arranging and review of fieldwork, decisions about legal significance and treatment, cost-benefit decisions, and budgets. Thus, information about cultural resources is not just information about places, things, and landscapes; it also comprises knowledge of management, context, and procedures. Cultural resources information systems, considered broadly, must retain and convey appropriate values about all of these things.

BLM's cultural resources are dominated by archaeological sites, both historic and prehistoric in age. Archaeological site information has been systematically collected and accumulated since

long before the National Historic Preservation Act of 1966 mandated the creation of inventories. Archaeologists began cataloguing and systematically mapping information about sites in the Southwest over a hundred years ago. In the 1920's, Frank Mera established a system of mapping and keeping notes on *all* archaeological sites in New Mexico at the Laboratory of Anthropology. The Smithsonian River Basin Surveys of the 1930's covered thousands of square miles throughout the country, recorded tens of thousands of archaeological sites, and created the foundation for archaeological information archives in most of the United States. The River Basin Surveys explicitly utilized a state-based numbering system for archaeological sites (despite the fact that the investigations were defined by drainage basins that frequently encompassed many states). The resulting trinomial system consists of a state number, a county letter code, and then a sequential number within each county. The enumeration of sites by number was necessary to catalog the huge number of finds in to museum collections where designations like "White's Point Mound 12A" would have been unwieldy.

The Growth of the Archaeological Survey and Standard Recording Formats

In more recent times, archaeology on the public lands or through public projects that fell under the Section 106 process have been of such importance to anthropological research that systematic electronic data collection has been an explicit approach in archaeology as a whole. For instance, in the mid-1970's the Southwest Anthropological Research Group (a coalition of researchers) created an explicitly computerized format for the SARG Database: a systematic set of observations to be made on every archaeological site. The database (which was intended for use only by SARG participants) was intended to answer the seemingly simple question of why sites are located in the places they are found.

In the late 1970's, regional recording formats for archaeological sites and rock art grew out of this broader interest in site distribution and contents. The Intermountain Antiquities Computer System (IMACS) recording form was devised to be entered into a database. BLM and the other major federal agencies, along with the western State Historic Preservation Offices IMACS use encompassed many of the states in which BLM has significant management interests (Idaho, Nevada, Utah, Wyoming, Montana, Colorado), and many states still use the same format (Wyoming, Colorado, and Montana have changed formats and Idaho has modified the format slightly). One goal of IMACS, and similar efforts within states (notably New Mexico, which began archive automation) was similar to the goal of SARG. Another goal of IMACS was the standardization of field techniques, observations, and site form creation. State boundaries did not exist in the past; their reification through different site recording techniques in each state hindered effective fieldwork and study.

Although the logic of consistent recording of archaeology regardless of state boundaries was in itself sufficient to gain favor in the professional scientific community, energy exploration and development throughout the west (kicked off by the energy crisis of the early 1970's) combined with the Federal Land Policy Management Act, created a huge boom in archaeological field surveys of public lands in the western U.S. A new industry "cultural resources management" was born: firms that specialized in archaeological work required by the growing use of public lands (mostly BLM-managed) by various undertakings. The volume of site records generated by cultural resources management necessitated a more rapid means of site recording. Standardized recording formats helped to speed the field process.

Thus, two factors created the first round of automation of cultural records in the "BLM states" and regions. First, the anthropological interest in site distribution. Second, huge acreages of new fieldwork finding thousands and thousands of sites. This forced many State Historic Preservation Offices (SHPOs), mandated to keep an inventory under Section 106 of the NHPA, to create some form of electronic site ledger. Typically, this was on a mainframe computer, heavily encoded to save storage space, and limited to a few attributes of each site. Also typical of these systems was that they contained only archaeological site information (sometimes only prehistoric sites). Other kinds of cultural resources information, notably, the management status of the archaeological sites or other parts of cultural resources information were not automated in to data systems.

Recognition of the Archive Problem

The fieldwork boom of the 1970's and 1980's flooded the archives of most SHPOs with new records. Some states created new staff positions of archive managers (sometimes combined with other job duties), others already had them. New and old archive managers faced problems of reviewing records for adequacy, physical filing, allowing appropriate access (for pre-field reviews and for undertaking reviews), staff, operating space, and funding. Archive managers in the IMACS states and several nearby (New Mexico, the western Great Plains) started meeting informally at the annual Plains Conference. This group, which informally adopted the moniker of Cultural Resource Information Managers Exchange (CRIME) realized that each archive faced similar problems. So, while each (paper) tower seemed a castle unto itself, solutions found in one place were useful in other places too. By the late 1980's most of the CRIME members were looking toward computerization of records, and many were contemplating the use of GIS to maintain map information on where sites were located and where inventories had been made. In 1993, Ebert and Associates – a consulting firm – investigated the automation of archives nationally under a grant from the National Science Foundation. The Ebert and Associates study confirmed that most archives in the western U.S. would move toward database management and GIS within the next decade.

The Ebert and Associates study identified GIS as the key technology that would bring site record archives into electronic data systems. GIS brings together most of the common business needs that users of site record archives have: assessment of prior areas of investigation, inclusion of attributes in simple tables (i.e., not implementing one to many relationships in the GIS, but information in tables beyond just map attributes), ready distribution as electronic files, and the ability to phrase queries and return results either geographically or by selecting attributes in a table. In 1993, of the 13 states in which BLM has significant lands under its management, only New Mexico was actively building GIS data.

Modeling the occurrence of archaeological sites was another factor that drove the increasing demands for effective records management in cultural resources as a whole. Public land managers realized very quickly that the demand for access to public lands for project staging would outstrip the agency's ability to perform new, intensive, fieldwork. Model-building to predict where archaeological sites would occur and (to some extent) their characteristics, became an important focus. Unlike the earlier SARG initiative, management of the resources was part of the rationale for modeling. Anthropological understanding of site location – essentially understanding "why" sites are where they are – was one line of model-building during the 1980's

but there were also suites of models built that sought to find the pattern of site occurrence without reference to why such a pattern might occur.

The BLM published a comprehensive edited volume on model-building approaches in archaeology in 1988. This volume remains a benchmark. At the time of its publication, many authors commented on how the expansion of GIS usage would impact model-building and management. The CRIME group, mentioned above, actively turned toward GIS as a topic of informal study. New Mexico, Wyoming, Arizona, and staff at Gnomon, Inc., began researching GIS technologies as a team of interested parties.

Spatial Data Falls In To Place

In the mid-1990's, the National Spatial Data Infrastructure was established by executive order. The NSDI as it is known creates a framework for the creation and retention of all geospatial data by federal agencies. The NSDI called for standard methods, values, and documentation of all geographically referenced data. The U.S. Geological Survey (USGS) was given lead responsibility for implementing the program, which it does through the Federal Geographic Data Committee (FGDC). One of the first actions of the FGDC was to establish a data standards creation and review process. Standards established by the FGDC are requirements that federal agencies must meet when creating geospatial data.

The FGDC's first product was a general standard for describing spatial data. The "Content Standard for Digital Geospatial Metadata" mandated particular categories of descriptive information for every federal geospatial dataset. The standard did not say how accurate data had to be, or specify sources or formats of data itself (metadata is information *about* data and this was a standard for how to describe data, hence a *metadata standard*). The FGDC next turned to standards creation for the *content* of spatial datasets.

Wyoming, New Mexico, and Gnomon, Inc. jointly applied for an FGDC grant to create an addition to the metadata standard – a tailoring of the specification – to fit the large datasets that were being (or soon would be) created in automating the Section 106-populated archives in the western U.S. The project involved multiple federal agencies, SHPOs, consultants, and state agencies. BLM, recognizing that it would soon be faced with implementing FGDC standards in some fashion, became one of the project sponsors. The grant had two significant outcomes. First, it met the goal of creating an extension to the FGDC spatial metadata standard that was more appropriate for the kinds of information prevalent in the western states. Second, it showed several things about the situation in the western states: (1) federal agencies use state-determined record formats because of the need to collaborate with SHPOs in each state (2) there is considerable variation between states (except for IMACS states) in site recording standards and report standards; (3) the work process itself was generally common from one state to the next ; (4) notwithstanding state-level variation, there is a high-level set of attributes that all participants in the work process agreed are either mandatory, mandatory if present, or strongly recommended.

The Genesis of CRDSP

Item (4) above is worthy of some further explanation, for it forms the core of the CRDSP concept. An example makes the idea clear, we think. All participants in the standards process agreed that a key piece of information about an archaeological site (or a cultural resource

generally) is its age. However, the way in which age is assessed or described varies from one region to another (even within the same state). For instance, an early historic site in New Mexico may be much older in years than an early historic site in Nevada. At some level, we can all agree that both sites are historic in age, but the terms appropriate for additional description are best considered local or regional. The reason for this is two-fold. First, there truly are different historical sequences represented in the archaeological record of different parts of the western states. Second, the history of archaeological inquiry has varied from one state or region to the next – creating inconsistent descriptions across recording format boundaries. On the other hand, the consistency of the Section 106 work process elucidated in the FGDC study makes a high degree of standardization possible in describing the work process itself, as opposed to the archaeology that is the subject of the work.

At the same time as the technical options were becoming clear, BLM was formulating a national programmatic agreement for how Section 106 would be conducted. All of the participants recognized that timely, correct, information was very valuable in meeting the requirements of Section 106 efficiently. Data development was acknowledged as an important, shared, responsibility of both the SHPOs and the BLM in the national agreement. Agreements formulated in each state used similar language about data development and sharing, but tailored to meet the situation of each SHPO.

BLM examined these outcomes in great detail and evaluated whether the agency was best served by creating its own data system or by forming partnerships with the SHPOs in the western states – most of whom were heading into the creation of sharable electronic datasets themselves. Because the review and agreement process – consultation – occurs at the state level the BLM concluded that it was more effective to collaborate at the state level rather than to create a single comprehensive national data system. By way of contrast, the U.S. Forest Service followed the latter course as part of its entire data management system, INFRA. Similarly, the National Park Service has a single data model for the National Parks called ASMIS. The USFS was able to fold the creation of INFRA Heritage in to INFRA development generally, which had a funding priority as the "do-everything" business system for the Forest Service. The National Park Service manages a very small part of the western landscape at a more measured pace than the public lands for which BLM is responsible – NPS staff have more opportunity to create database entries and work with fitting additional descriptive information in to a national framework.

BLM also had its own information systems in place or being built on a piecemeal basis. Some field offices (then known as Districts and Resource Areas) had GIS digitizing or database population (or both) underway. Each used its own unique format that fit its local preferences.

The problem of piecemeal information systems development is sometimes called "stove piping", because it is like having a house in which each stove has its own chimney. The CRDSP is based on the premise that the common "chimney" for *detailed information about a resource* is at the state (SHPO) level, not at the national level. The different state "chimneys" then can be merged into a more general national "chimney". A key idea here is that the state-level systems be intentionally designed to provide information at the level of abstraction required nationally. Data sharing agreements, often tied to the state-level programmatic agreements between BLM and SHPOs, provide a framework for appropriate interaction.

In formulating the CRDSP, the cultural resources staff in the Washington D.C. office (WO240) saw that BLM could partner with the SHPOs to achieve a common goal. As well, other agencies

and parties in the process (including industry) could be useful partners too. The CRDSP began a period of several years of coalition building at the state and national levels. One major success was with the Department of Energy, which immediately saw the wisdom of better decision-making support with improved information and funded several projects in the western states that created and enhanced datasets themselves and created new ways to deliver and analyze the data. Another major data-creation and sharing effort has been the Mohave Desert Ecosystem Project, a shared venture with Department of Defense, the National Park Service, and the BLM. This project created digital data for much of southeastern California.

Part of the coalition building was a series of presentations throughout the western states, many made with SHPO partners, to other agencies. BLM has created a "Data User Group" (DUG) that incorporates agency and SHPO partners explicitly and is open to other participants too. The core members of the DUG consist of BLM Field office staff (one per state) and SHPO data managers (also one per state), WO240 staff, and any appropriate contractors. The DUG has held annual meetings or, more recently, teleconferences. Like the CRIME group of years past, the DUG is intended to share successes and alert others to failures) in order to make the arduous process of data system development and maintenance more efficient. In addition to the national DUG, some states have discussion groups either run by the SHPO or by the BLM. These coalitions address issues and needs within each state.

The BLM has provided funding and technical assistance in each of the CRDSP states. Following the model that local relationships work most effectively, BLM has gained greatest benefit by allowing each state office to determine how best to distribute the funding provided for the CRDSP within that state. So, in one state funding may have gone toward an area in which fuels management and response demanded better data for planning, while in another state funds went toward SHPO developing web-based GIS services so that cultural resources professionals could work more swiftly on day to day Section 106 projects.